PART I

PREDICTING WATER EROSION LOSSES

SECTION B

THE FOLLOWING SECTION CONTAINS INFORMATION NEEDED TO CALCULATE WATER EROSION BY USE OF THE REVISED UNIVERSAL SOIL LOSS EQUATION

I. THE REVISED UNIVERSAL SOIL LOSS EQUATION

The Revised Universal Soil Loss Equation (RUSLE), is an erosion model designed to predict the longterm average annual soil loss "A" carried by runoff from specific field slopes in specific cropping and management systems. Widespread use and thousands of plot-data years have substantiated the usefulness and validity of RUSLE for this purpose. RUSLE is also applicable to nonagricultural conditions such as construction sites. Though RUSLE retains the six USLE factors as defined in Agricultural Handbook No. 537 to calculate average annual soil loss from a hillslope, the technology for evaluating these factor values has been altered and new data have been added and incorporated into Agricultural Handbook 703.

The DOS computer version of RUSLE (version 1.05) was used to develop the values in the erosion prediction tables that follow. To compute the average annual erosion rate on a field slope, select appropriate values from the figures and tables for "R", "K", "LS", "C", and "P" and multiply the values together. Erosion predictions are also supported by the FOCS RUSLE module, though the user is still required to utilize the "C" factor lookup tables as shown on Pages D-5 to D-63, Erosion Prediction, Part I, Section D, Appendix.

The equation is expressed as follows:

A = RKLSCP *or* ReqKLSCP

where:

A = the predicted average annual soil loss from interrill (sheet) and rill erosion. Units for factor values are usually selected so that "A" is expressed in tons per acre per year.

R = the factor for climatic erosivity. The rainfall factor is the average annual total of the storm EI values for a particular locale. The EI index is a product of total storm energy times the maximum 30 minute intensity.

Req = the factor for climatic erosivity in the Northwestern Wheat and Range Region, including western Wyoming. Measured soil losses in this area are much greater than what might be expected from "R" values calculated with the conventional kinetic energy times maximum 30-min intensity (EI). Much of the soil loss occurs by rilling when the surface part of the soil profile thaws and snowmelt or rain occurs on the still partially frozen soil. Therefore, to more accurately predict soil losses for this condition, an "Req" value has been calculated.

K = the factor which represents the inherent susceptibility of soils to erode. The soil erodibility factor is the rate of soil loss per rainfall erosion index unit for a specific soil in cultivated continuous fallow on a 9 percent slope 72.6 feet long.

L = the factor of slope length. The slope length factor is the ratio of soil loss on a given slope length to that from a plot with a length of 72.6 feet. Slope length is the distance from the point of origin of overland flow to (1) the point where the slope decreases to the extent that deposition begins, or (2) the point where runoff enters a defined channel.

S = the factor for slope gradient. The slope-gradient factor is the ratio of soil loss from the field gradient to that from a 9 percent slope under otherwise identical conditions. Computed soil loss rates are usually more sensitive to slope gradient changes than to slope length changes.

LS = the "topographic" factor. The slope length "L" and slope gradient "S" factors are combined into the "LS" factor in the RUSLE equation. An "LS" value represents the relationship of the actual field slope condition to the unit plot.

C = the factor for cover and management. The cover and management factor is the ratio of soil loss from an area with a specified cropping and management sequence to that from the fallow condition on which the "K" factor is evaluated.

P = the factor for support practices. The support practice factor is the ratio of soil loss with contouring, stripcropping, or terracing to that with straight-row farming up and down slope.

T = the soil loss tolerance expressed as tons per acre per year.

II. DETERMINING FACTOR VALUES FOR THE RUSLE

R - Obtained from Section I, maps, of the FOTG, or from Figure 2, Page B-3, Erosion Prediction, Part I, Section B.

Req - Obtained from Figure 3 and Table 2, Pages B-5 and B-6, Erosion Prediction, Part I, Section B.

K - Obtained from Section II of the FOTG, and from Figures 4 and 5, Pages B-8 and B-9, Erosion Prediction, Part I, Section B and from Table 3, Pages B-10 and B-11, Erosion Prediction, Part I, Section B. See the following section on "K" values.

LS - Obtained from Tables 4-9, Pages B-14 to B-19, Erosion Prediction, Part I, Section B.

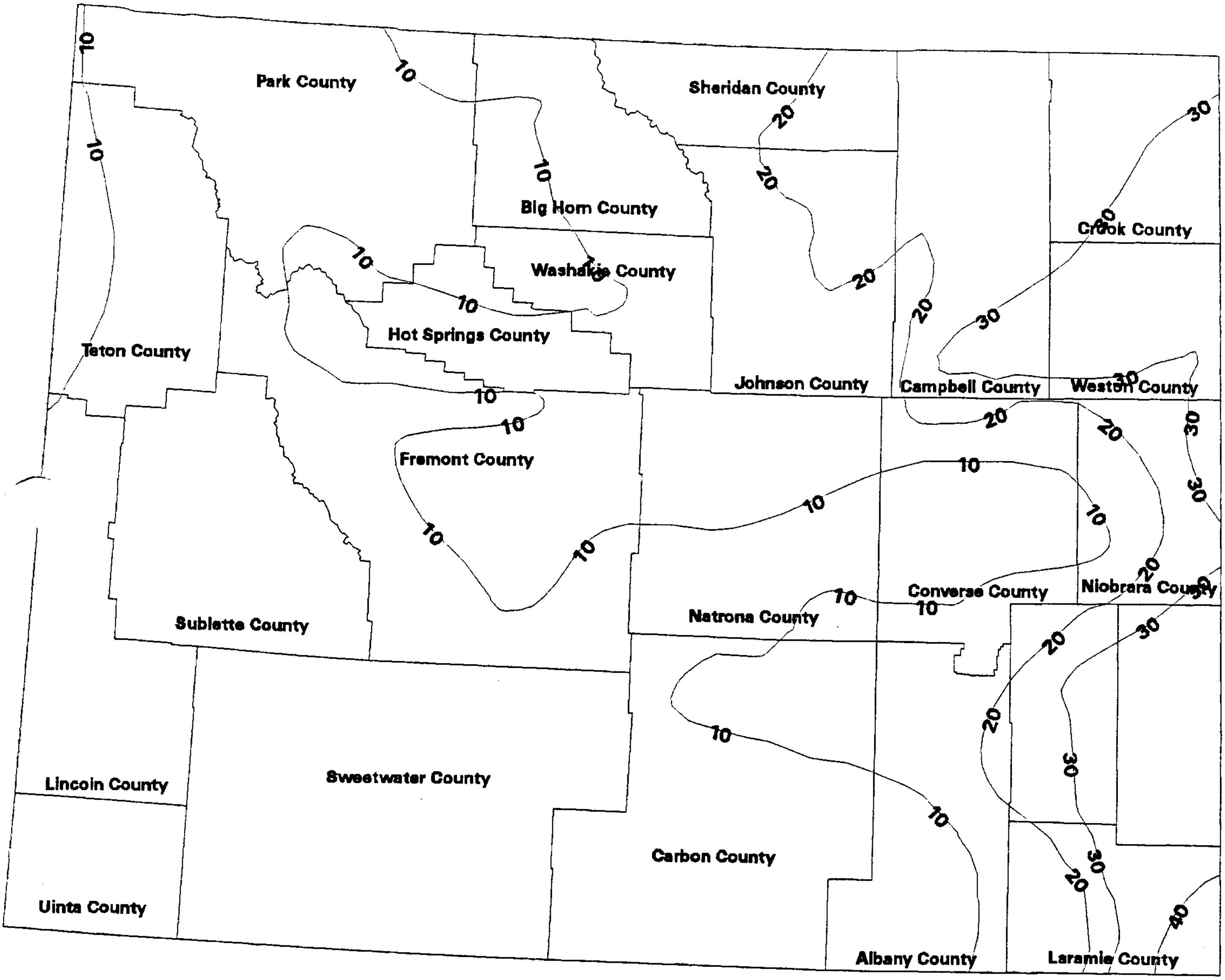
C - Obtained from Figure 7, Page B-24, Erosion Prediction, Part I, Section B, and from Table C1, Pages D-5 to D-63, Erosion Prediction, Part I, Section D, Appendix.

P - Obtained from Pages B-32 to B-47, Erosion Prediction, Part I, Section B, from Table 3 and 3A, Pages D-64 to D-119, and from Figures 1 to 38, Pages D-120 to D-157, Erosion Prediction, Part I, Section D, Appendix.

A. RAINFALL FACTOR "R"

The rainfall factor for the RUSLE was derived from research data from many sources. The data indicates that when factors other than rainfall are held constant, soil losses from cultivated fields are directly proportional to a rainstorm parameter; the product of total storm energy **(E)** and the maximum 30 minute intensity **(I)**. Rills and sediment deposits observed after an unusually intense storm have sometimes led to the conclusion that significant erosion is associated with only a few severe storms. However, more than 30 years of measurements have shown that this is not the case. Therefore, "R" for any particular location will be the average annual total of the storm "EI" values.

FIGURE 2
RUSLE RAINFALL FACTOR (R) MAP



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B. RAINFALL/SNOWMELT FACTOR "Req"

The "R" index does not include the erosive forces of runoff from snowmelt, rain on frozen soil, or irrigation. A procedure for evaluating "R" for locations where this type of runoff is significant is then necessary to accurately predict erosion losses. Observations indicate that much of the soil loss occurs by rilling phenomena when the surface part of the soil profile thaws and snowmelt or rain occurs. In Wyoming, the "Req" area occurs primarily west of the continental divide. The formula for calculating "Req" values in the "Req" area is:

$$\mathbf{Req = 7.78 \times P - 48.4}$$

where, P = the average annual precipitation.

Use locally available average annual precipitation values for calculating "Req" values. If local data is unavailable, use the Wyoming Average Annual Precipitation map from January 1983. The map represents a 30 year (1941-1970) compilation of data from NRCS (SCS) and the National Weather Service.

Average annual precipitation values of 8 inches to 25 inches have been converted to "Req" values in Table 2, **Req Values**, Page B-6, Erosion Prediction, Part I, Section B.

Example:

If the area being evaluated is west of the continental divide, and the average annual precipitation is 15 inches, the "Req" value would be:

Req = (7.78) (15) - 48.4 = 68.

FIGURE 3
WYOMING Req AREA

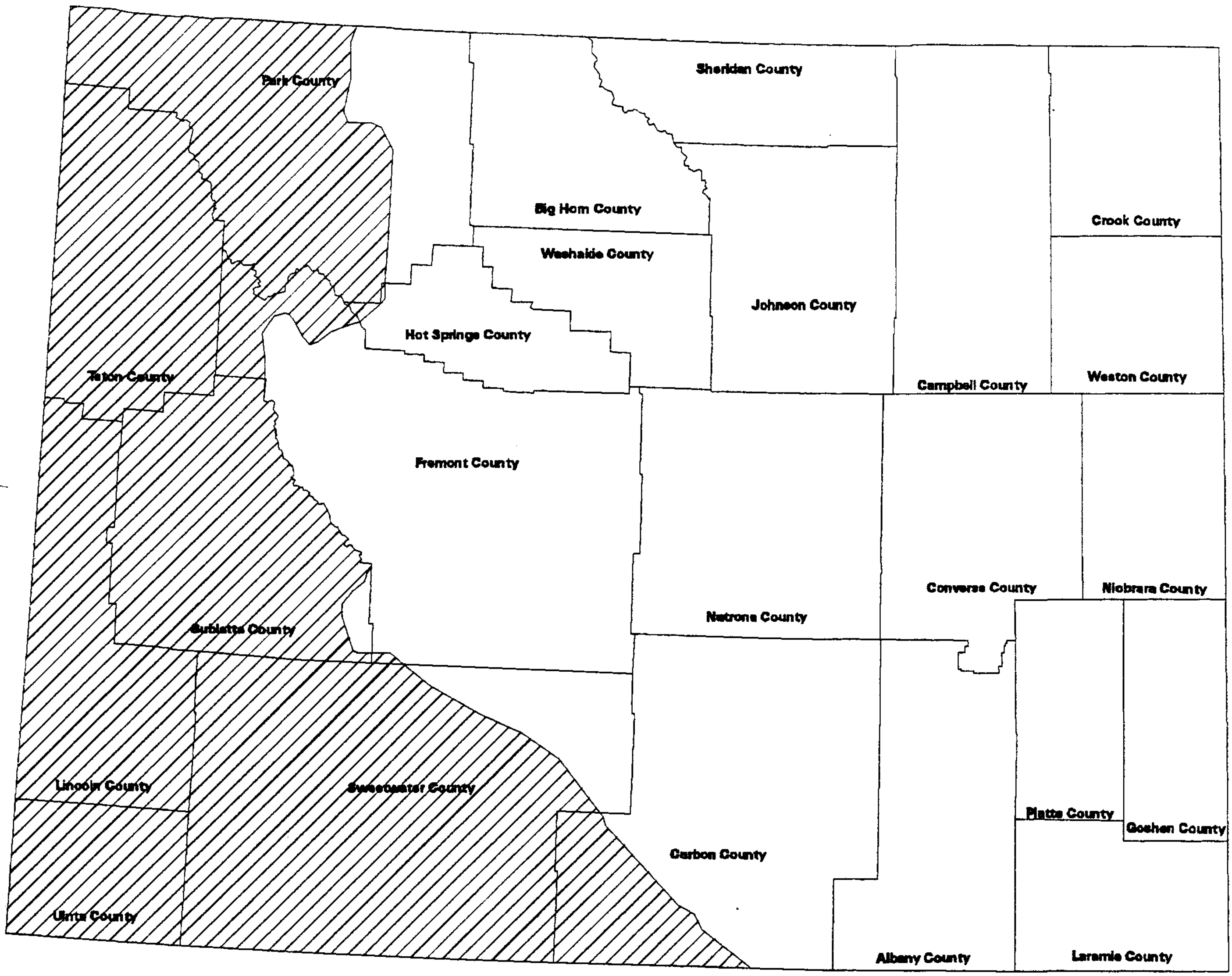

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TABLE 2

Req Values From Average Annual Precipitation

Average Annual Precipitation (P)	Req Value
8	14
9	22
10	29
11	37
12	45
13	53
14	61
15	68
16	76
17	84
18	92
19	99
20	107
21	115
22	123
23	131
24	139
25	146

C. SOIL ERODIBILITY FACTOR "K"

The soil erodibility factor in RUSLE accounts for the influence of soil properties on soil loss during storm events on upland areas. The soil erodibility factor is the rate of soil loss per rainfall erosion index unit as measured on a standardized plot.

The RUSLE program adjusts "K" values for the effect of freeze-thaw processes and changes in soil moisture content of the surface soil layer throughout the year. The adjusted value called "average K" (Kav) is the time variable "K" value that is determined from the average value of biweekly calculations of "K" for a period of one year.

However, the Agriculture Research Service (ARS) has indicated that the equations for time variable "K" (Kav) in the RUSLE model are too sensitive to frost-free season values in certain portions of the United States. Therefore, an interim procedure has been developed to calculate the correct "K" value in Wyoming.

The soil survey database includes two kinds of "K" values for each soil component in each map unit. The first factor "Kf", represents soil erodibility of only the fine earth fraction (<2mm size). Values for "K" factors in published soil survey reports are commonly equivalent to the second factor, "Kw". RUSLE requires "Kf" values ("fines").

Procedure

To select a "K" factor, determine whether you are to use "Kav" or "Kf" by referring to Figure 4, **K-factor Adjustment Boundary**, Page B-8, Erosion Prediction, Part I, Section B.

Areas west of the boundary will use "Kf" values directly from the RUSLE Soil Data Tables in Cropland Interpretations, Section II of the FOTG. This "Kf" value will be used for both manual **and** software generated RUSLE predictions. Select the soil map unit and read "Kf" directly from the data sheets. **No time variable adjustments will be made for areas west of the boundary**. For ease of reference, RUSLE Soil Data tables may be inserted after page B-8.

For areas east of the boundary **(when making manual RUSLE calculations only, as the RUSLE software automatically computes the correct "Kav")** each city site in the "Kav" area has a data sheet for estimating the seasonally variable soil erodibility factor. "Kav" data sheets for each county start on page B-10, Table 3**, Average Annual "K" Factor Adjustments**, Pages B-10 to B-11, Erosion Prediction, Part I, Section B.

1. Obtain the assigned "K" and "R" factors for the appropriate soil map unit from the Soil Data Tables in Cropland Interpretations, Section II of the FOTG.

2. From Table 3, **Average Annual "K" Factor Adjustments**, Pages B-10 to B-11, Erosion Prediction, Part I, Section B find the adjusted "K" factor that corresponds to the "K" factor determined from step 1. This is the "K" factor to use in the RUSLE computations. **Again, these adjusted "K" values are only for use when making manual RUSLE calculations.** For any "K" values outside of the ranges presented in the tables, contact the State Conservation Agronomist.

FIGURE 4
WYOMING "K" FACTOR ADJUSTMENT BOUNDARY

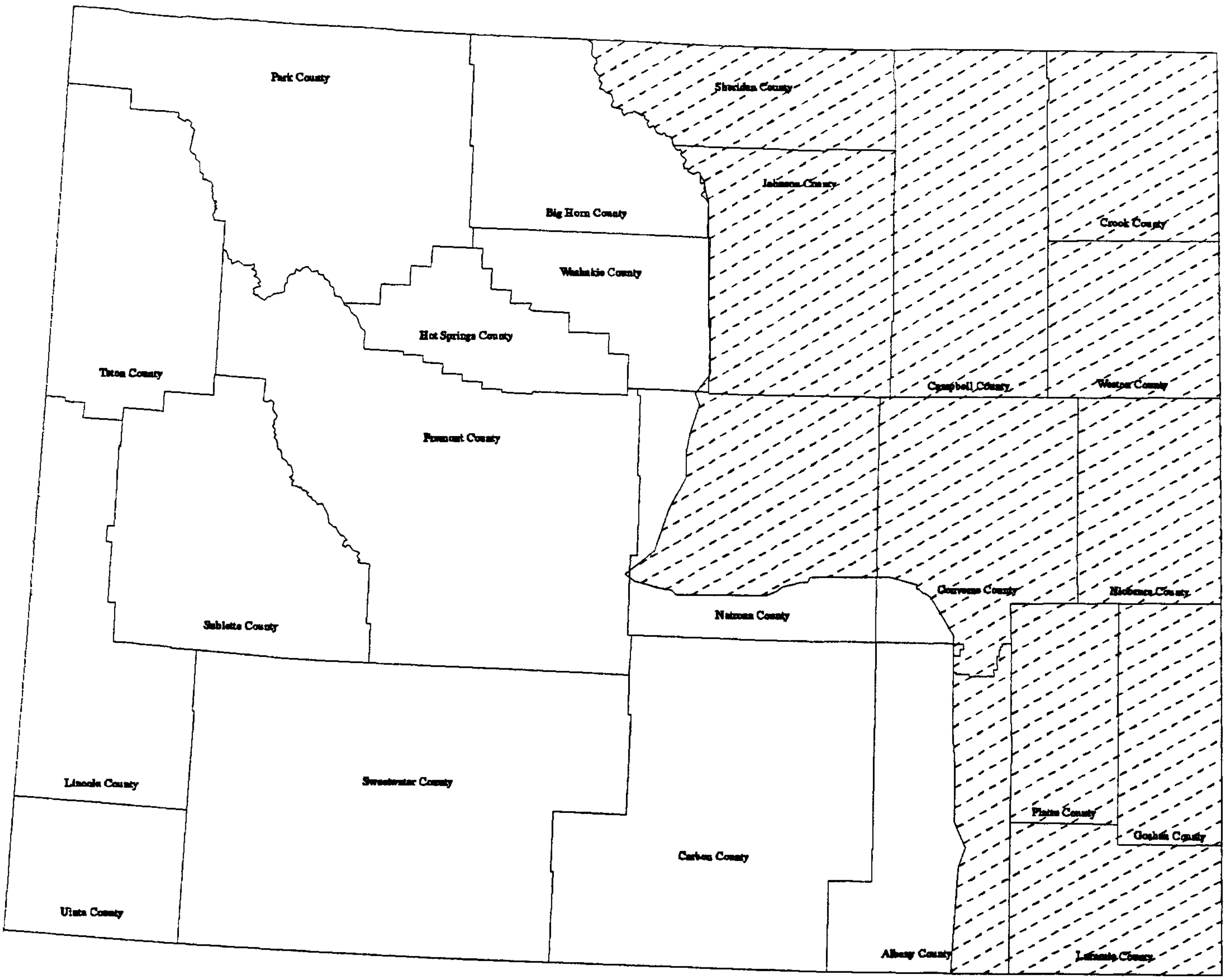

FIGURE 5

RUSLE "C" AND "K" FACTOR ZONES

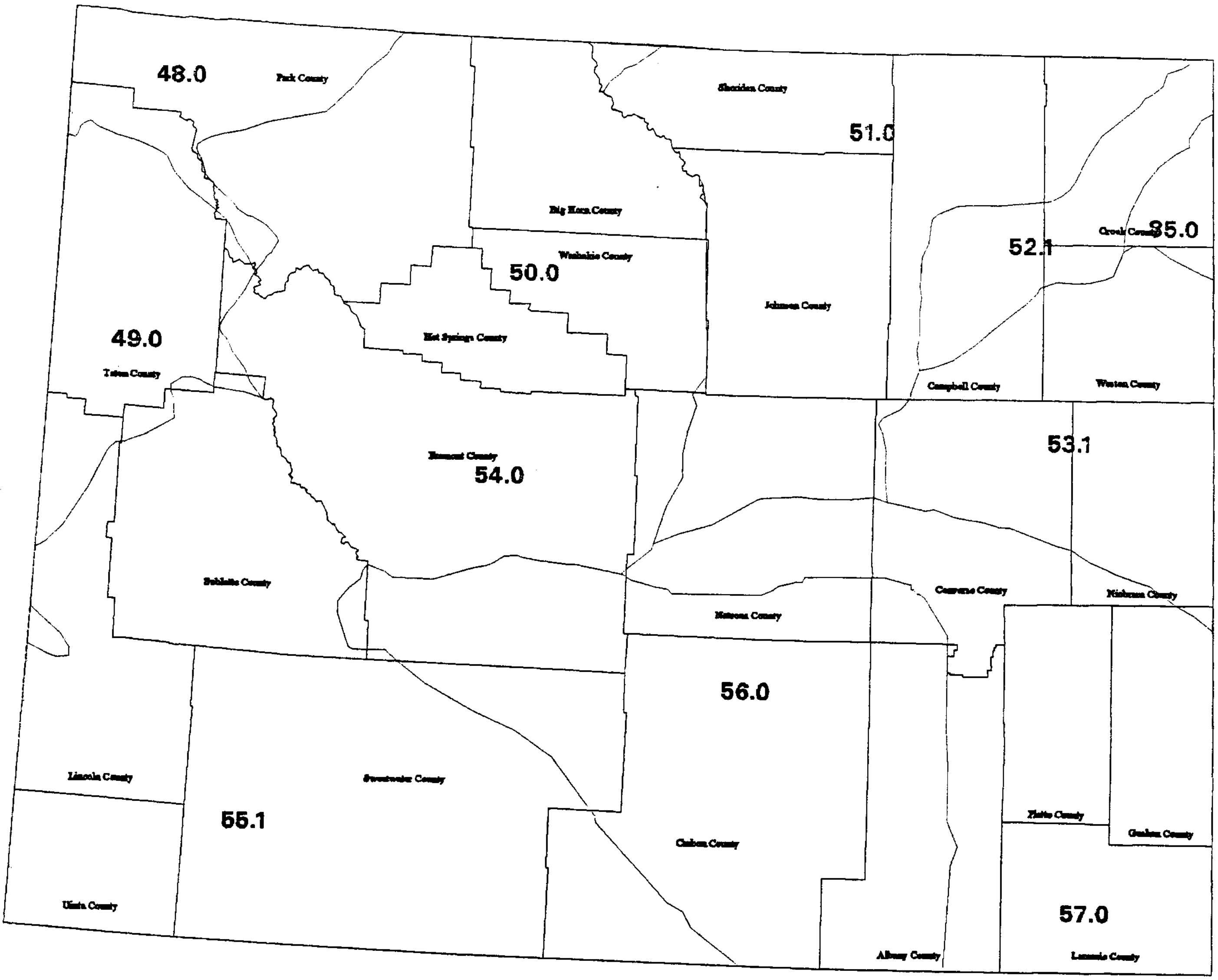

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TABLE 3
AVERAGE ANNUAL "K" FACTOR ADJUSTMENTS

Zone 51										
R/K	.10	.15	.17	.20	.24	.28	.32	.37	.43	.49
10	.12	.17	.20	.24	.28	.32	.37	.43	.49	.55
15	.12	.17	.20	.24	.28	.32	.37	.43	.49	.55
20	.12	.17	.20	.24	.28	.32	.37	.43	.49	.55
25	.12	.17	.20	.24	.28	.32	.37	.43	.49	.55
30	.12	.17	.20	.24	.28	.32	.37	.43	.49	.55

Zone 52.1										
R/K	.10	.15	.17	.20	.24	.28	.32	.37	.43	.49
10	.12	.17	.20	.24	.28	.32	.37	.43	.49	.55
15	.12	.17	.20	.24	.28	.32	.37	.43	.49	.55
20	.12	.17	.20	.24	.28	.32	.37	.43	.49	.55
25	.12	.17	.20	.24	.28	.32	.37	.43	.49	.55
30	.12	.17	.20	.24	.28	.32	.37	.43	.49	.55

Zone 53.1										
R/K	.10	.15	.17	.20	.24	.28	.32	.37	.43	.49
10	.12	.17	.20	.24	.28	.32	.37	.43	.49	.55
15	.12	.17	.20	.24	.28	.32	.37	.43	.49	.55
20	.12	.17	.20	.24	.28	.32	.37	.43	.49	.55
25	.12	.17	.20	.24	.28	.32	.37	.43	.49	.55
30	.12	.17	.20	.24	.28	.32	.37	.43	.49	.55

TABLE 3, cont'd

AVERAGE ANNUAL "K" FACTOR ADJUSTMENTS

Zone 57										
R/K	.10	.15	.17	.20	.24	.28	.32	.37	.43	.49
10	.12	.17	.20	.24	.28	.32	.37	.43	.49	.55
15	.12	.17	.20	.24	.28	.32	.37	.43	.49	.55
20	.12	.17	.20	.24	.28	.32	.37	.43	.49	.55
25	.12	.17	.20	.24	.28	.32	.37	.43	.49	.55
30	.12	.17	.20	.24	.28	.32	.37	.43	.49	.55
35	.12	.17	.20	.24	.28	.32	.37	.43	.49	.55
40	.12	.17	.20	.24	.28	.32	.37	.43	.49	.55
45	.12	.17	.20	.24	.28	.32	.37	.43	.49	.55
50	.12	.17	.20	.24	.28	.32	.37	.43	.49	.55
55	.12	.17	.20	.24	.28	.32	.37	.43	.49	.55

Zone 85										
R/K	.10	.15	.17	.20	.24	.28	.32	.37	.43	.49
15	.12	.17	.20	.24	.28	.32	.37	.43	.49	.55
20	.12	.17	.20	.24	.28	.32	.37	.43	.49	.55
25	.12	.17	.20	.24	.28	.32	.37	.43	.49	.55
30	.12	.17	.20	.24	.28	.32	.37	.43	.49	.55
35	.12	.17	.20	.24	.28	.32	.37	.43	.49	.55

D. SLOPE LENGTH AND SLOPE STEEPNESS FACTOR "LS"

Slope length in feet and slope steepness in percent are combined into the "LS" factor. Slope length "L" is defined as the **horizontal** distance from the origin of overland flow to the point where either (1) the slope gradient decreases enough that deposition begins, or (2) runoff becomes concentrated in a defined channel. The slope steepness factor (S) represents the influence of slope gradient on erosion.

There are four separate "LS" tables in RUSLE. Table 4, Page B-14, Erosion Prediction, Section I, Part B is used for rangeland and pastureland where the ratio of rill to interill erosion is low. Table 5, Page B-15, Erosion Prediction, Section I, Part B is used for cropland where the ratio of rill to interrill erosion is moderate, such as cropland with little to moderate cover. Table 6, Page B-16, Erosion Prediction, Section I, Part B is used for construction sites where the ratio of rill to interrill erosion is high and the soil has a strong tendency to rill. Table 7, Page B-17, Erosion Prediction, Section I, Part B is used for thawing soil where most of the erosion is caused by surface flow (Req area). Note that only tables 4 and 7 may be used in the "Req" area of the state.

Soil loss is also affected by the "shape" of the slope. Many field slopes will either steepen toward the lower end or flatten toward the lower end (convex or concave). Use of the values for the average gradient in Tables 4 through 7 would incorrectly estimate soil movement on these non-uniform slopes. For this reason, values taken directly from Tables 4 through 7 should not be used for anything other than uniform slopes. In addition, successive slope segments cannot be evaluated as independent slopes because runoff flows from each segment to the next. Therefore, for irregular slopes, "LS" values must be adjusted to account for effects of slope shape.

Procedure

Step 1. Divide the complex slope into two or more equal length segments in such a manner that the gradient within a particular reach can be considered uniform.

Step 2. Determine the percent slope for each segment.

Step 3. List the segment gradients in the order in which they occur on the slope, beginning at the upper end of the slope.

Step 4. Record the "LS" factor, using Tables 4 through 7, that represents each segment gradient and corresponds to the total slope length.

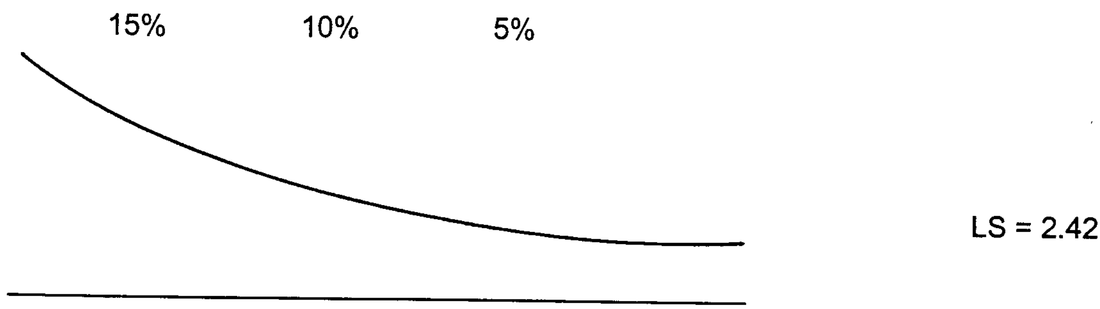
Step 5. Determine the slope-length exponent from Table 8, **Slope Length Exponents**, Page B-18, Erosion Prediction, Section I, Part B.

Step 6. Once the slope-length exponent is selected, use it to choose the Soil Loss Factor from Table 9, **Soil Loss Factor**, Page B-19, Erosion Prediction, Section I, Part B.

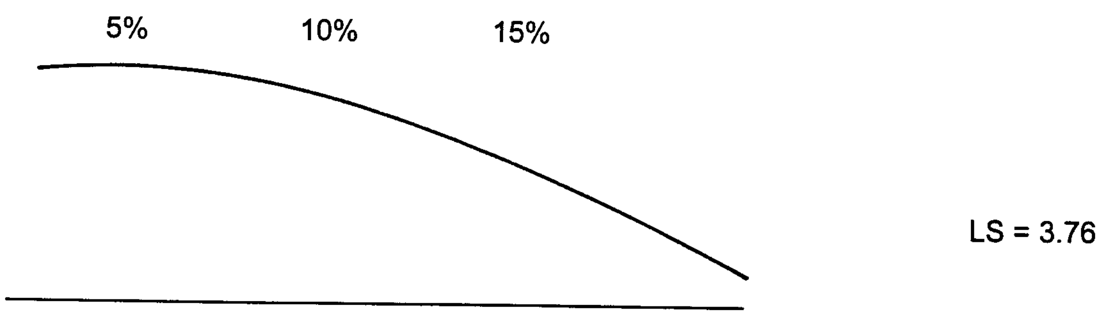
Step 7. Multiply these segment "LS" values by the corresponding factors from Table 9. Add the products and divide by the number of segments. This average represents the effective "LS" value of the non-uniform slope.

Figure 6

Example of dividing complex slopes into equal length segments of uniform slope.



Concave Slope with Slope Length = 400 Ft



Convex Slope with Slope Length = 400 Ft

See page B-20 and B-21 for more detailed examples of how complex slope "LS" values are calculated.

TABLE 4

RUSLE SLOPE-EFFECT FACTORS "LS" FOR AREAS WITH LOW RATIO OF RILL TO INTERRILL EROSION 1/

Slope Gradient (%)	Horizontal Slope Length (ft) <3	6	9	12	15	25	50	75	100	150	200	250	300	400	600	800	1000
0.2	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
0.5	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
1.0	0.12	0.12	0.12	0.12	0.12	0.13	0.13	0.14	0.14	0.15	0.15	0.15	0.15	0.16	0.16	0.17	0.17
2.0	0.20	0.20	0.20	0.20	0.20	0.21	0.23	0.25	0.26	0.27	0.28	0.29	0.30	0.31	0.33	0.34	0.35
3.0	0.26	0.26	0.26	0.26	0.26	0.29	0.33	0.36	0.38	0.40	0.43	0.44	0.46	0.48	0.52	0.55	0.57
4.0	0.33	0.33	0.33	0.33	0.33	0.36	0.43	0.46	0.50	0.54	0.58	0.61	0.63	0.67	0.74	0.78	0.82
5.0	0.38	0.38	0.38	0.38	0.38	0.44	0.52	0.57	0.62	0.68	0.73	0.78	0.81	0.87	0.97	1.04	1.10
6.0	0.44	0.44	0.44	0.44	0.44	0.50	0.61	0.68	0.74	0.83	0.90	0.95	1.00	1.08	1.21	1.31	1.40
8.0	0.54	0.54	0.54	0.54	0.54	0.64	0.79	0.90	0.99	1.12	1.23	1.32	1.40	1.53	1.74	1.91	2.05
10.0	0.60	0.63	0.65	0.66	0.68	0.81	1.03	1.19	1.31	1.51	1.67	1.80	1.92	2.13	2.45	2.71	2.93
12.0	0.61	0.70	0.75	0.80	0.83	1.01	1.31	1.52	1.69	1.97	2.20	2.39	2.56	2.85	3.32	3.70	4.02
14.0	0.63	0.76	0.85	0.92	0.98	1.20	1.58	1.85	2.08	2.44	2.73	2.99	3.21	3.60	4.23	4.74	5.18
16.0	0.65	0.82	0.94	1.04	1.12	1.38	1.85	2.18	2.46	2.91	3.28	3.60	3.88	4.37	5.17	5.82	6.39
20.0	0.68	0.93	1.11	1.26	1.39	1.74	2.37	2.84	3.22	3.85	4.38	4.83	5.24	5.95	7.13	8.10	8.94
25.0	0.73	1.05	1.30	1.51	1.70	2.17	3.00	3.63	4.16	5.03	5.76	6.39	6.96	7.97	9.65	11.04	12.26
30.0	0.77	1.16	1.48	1.75	2.00	2.57	3.60	4.40	5.06	6.18	7.11	7.94	8.68	9.99	12.19	14.04	15.66
40.0	0.85	1.36	1.79	2.17	2.53	3.30	4.73	5.84	6.78	8.37	9.71	10.91	11.99	13.92	17.19	19.96	22.41
50.0	0.91	1.52	2.06	2.54	3.00	3.95	5.74	7.14	8.33	10.37	12.11	13.65	15.06	17.59	21.88	25.55	28.82
60.0	0.97	1.67	2.29	2.86	3.41	4.52	6.63	8.29	9.72	12.16	14.26	16.13	17.84	20.92	26.17	30.68	34.71

1/ Such as for rangeland and other consolidated soil conditions with cover (applicable to thawing soil where both interrill and rill erosion are significant).

TABLE 5

RUSLE SLOPE-EFFECT FACTORS "LS" FOR AREAS WITH MODERATE RATIO OF RILL TO INTERRILL EROSION 2/

Slope Gradient (%)	Horizontal Slope Length (ft)																
	<3	6	9	12	15	25	50	75	100	150	200	250	300	400	600	800	1000
0.2	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06
0.5	0.07	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.09	0.09	0.09	0.09	0.09	0.10	0.10	0.10	0.10
1.0	0.11	0.11	0.11	0.11	0.11	0.12	0.13	0.14	0.14	0.15	0.16	0.17	0.17	0.18	0.19	0.20	0.20
2.0	0.17	0.17	0.17	0.17	0.17	0.19	0.22	0.25	0.27	0.29	0.31	0.33	0.35	0.37	0.41	0.44	0.47
3.0	0.22	0.22	0.22	0.22	0.22	0.25	0.32	0.36	0.39	0.44	0.48	0.52	0.55	0.60	0.68	0.75	0.80
4.0	0.26	0.26	0.26	0.26	0.26	0.31	0.40	0.47	0.52	0.60	0.67	0.72	0.77	0.86	0.99	1.10	1.19
5.0	0.30	0.30	0.30	0.30	0.30	0.37	0.49	0.58	0.65	0.76	0.85	0.93	1.01	1.13	1.33	1.49	1.63
6.0	0.34	0.34	0.34	0.34	0.34	0.43	0.58	0.69	0.78	0.93	1.05	1.16	1.25	1.42	1.69	1.91	2.11
8.0	0.42	0.42	0.42	0.42	0.42	0.53	0.74	0.91	1.04	1.26	1.45	1.62	1.77	2.03	2.47	2.83	3.15
10.0	0.46	0.48	0.50	0.51	0.52	0.67	0.97	1.19	1.38	1.71	1.98	2.22	2.44	2.84	3.50	4.06	4.56
12.0	0.47	0.53	0.58	0.61	0.64	0.84	1.23	1.53	1.79	2.23	2.61	2.95	3.26	3.81	4.75	5.56	6.28
14.0	0.48	0.58	0.65	0.70	0.75	1.00	1.48	1.86	2.19	2.76	3.25	3.69	4.09	4.82	6.07	7.15	8.11
16.0	0.49	0.63	0.72	0.79	0.85	1.15	1.73	2.20	2.60	3.30	3.90	4.45	4.95	5.86	7.43	8.79	10.02
20.0	0.52	0.71	0.85	0.96	1.06	1.45	2.22	2.85	3.40	4.36	5.21	5.97	6.68	7.97	10.23	12.20	13.99
25.0	0.56	0.80	1.00	1.16	1.30	1.81	2.82	3.65	4.39	5.69	6.83	7.88	8.86	10.65	13.80	16.58	19.13
30.0	0.59	0.89	1.13	1.34	1.53	2.15	3.39	4.42	5.34	6.98	8.43	9.76	11.01	13.30	17.37	20.99	24.31
40.0	0.65	1.05	1.38	1.68	1.95	2.77	4.45	5.87	7.14	9.43	11.47	13.37	15.14	18.43	24.32	29.60	34.48
50.0	0.71	1.18	1.59	1.97	2.32	3.32	5.40	7.17	8.78	11.66	14.26	16.67	18.94	23.17	30.78	37.65	44.02
60.0	0.76	1.30	1.78	2.23	2.65	3.81	6.24	8.33	10.23	13.65	16.76	19.64	22.36	27.45	36.63	44.96	52.70

2/ Such as for row-cropped agricultural and other moderately consolidated soil conditions with little-to-moderate cover (not applicable to thawing soil).

TABLE 7

RUSLE SLOPE-EFFECT FACTORS "LS" FOR THAWING SOILS WHERE MOST OF THE EROSION IS CAUSED BY SURFACE FLOW

Slope Gradient	Horizontal Slope Length (ft)												
(%)	15	25	50	75	100	150	200	250	300	400	600	800	1000
0.2	0.02	0.03	0.04	0.05	0.06	0.07	0.09	0.10	0.10	0.12	0.15	0.17	0.19
0.5	0.04	0.05	0.07	0.09	0.10	0.12	0.14	0.16	0.17	0.20	0.24	0.28	0.31
1.0	0.06	0.08	0.11	0.14	0.16	0.20	0.23	0.26	0.28	0.32	0.40	0.46	0.51
2.0	0.11	0.14	0.20	0.25	0.29	0.35	0.41	0.46	0.50	0.58	0.71	0.82	0.91
3.0	0.16	0.21	0.29	0.36	0.42	0.51	0.59	0.66	0.72	0.83	1.02	1.17	1.31
4.0	0.21	0.27	0.38	0.47	0.54	0.66	0.77	0.86	0.94	1.08	1.33	1.53	1.71
5.0	0.26	0.33	0.47	0.58	0.67	0.82	0.94	1.06	1.16	1.34	1.64	1.89	2.11
6.0	0.31	0.40	0.56	0.69	0.79	0.97	1.12	1.26	1.38	1.59	1.95	2.25	2.51
8.0	0.41	0.52	0.74	0.91	1.05	1.28	1.48	1.65	1.81	2.09	2.56	2.96	3.31
10.0	0.48	0.62	0.88	1.08	1.25	1.53	1.77	1.98	2.16	2.50	3.06	3.54	3.95
12.0	0.54	0.70	0.98	1.21	1.39	1.71	1.97	2.20	2.41	2.78	3.41	3.94	4.40
14.0	0.59	0.76	1.08	1.32	1.53	1.87	2.16	2.41	2.64	3.05	3.74	4.31	4.82
16.0	0.64	0.82	1.17	1.43	1.65	2.02	2.33	2.61	2.86	3.30	4.04	4.67	5.22
20.0	0.73	0.94	1.33	1.63	1.88	2.30	2.66	2.97	3.25	3.76	4.60	5.31	5.94
25.0	0.83	1.07	1.51	1.85	2.13	2.61	3.02	3.37	3.69	4.27	5.23	6.03	6.75
30.0	0.91	1.18	1.67	2.05	2.36	2.89	3.34	3.73	4.09	4.72	5.78	6.68	7.47
40.0	1.07	1.38	1.95	2.39	2.75	3.37	3.90	4.36	4.77	5.51	6.75	7.79	8.71
50.0	1.19	1.54	2.18	2.67	3.08	3.77	4.35	4.87	5.33	6.16	7.54	8.71	9.74
60.0	1.30	1.67	2.37	2.90	3.35	4.10	4.74	5.30	5.80	6.70	8.20	9.47	10.59

TABLE 8

SLOPE LENGTH EXPONENTS

	Rill/interrill ratio		
Slope %	Low	Moderate	High
0.2	0.02	0.04	0.07
0.5	0.04	0.08	0.16
1.0	0.08	0.15	0.26
2.0	0.14	0.24	0.39
3.0	0.18	0.31	0.47
4.0	0.22	0.36	0.53
5.0	0.25	0.40	0.57
6.0	0.28	0.43	0.60
8.0	0.32	0.48	0.65
10.0	0.35	0.52	0.68
12.0	0.37	0.55	0.71
14.0	0.40	0.57	0.72
16.0	0.41	0.59	0.74
20.0	0.44	0.61	0.76
25.0	0.47	0.64	0.78
30.0	0.49	0.66	0.79
40.0	0.52	0.68	0.81
50.0	0.54	0.70	0.82
60.0	0.55	0.71	0.83

TABLE 9

SOIL LOSS FACTOR

No. of Segments	Sequential No. of Segments	0.05	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80
		Slope-length exponent from Table 8								
2	1	0.97	0.93	0.87	0.81	0.76	0.71	0.66	0.62	0.57
	2	1.03	1.07	1.13	1.19	1.24	1.29	1.34	1.38	1.43
3	1	0.95	0.90	0.80	0.72	0.64	0.58	0.52	0.46	0.42
	2	1.01	1.02	1.04	1.05	1.06	1.05	1.05	1.04	1.03
	3	1.04	1.08	1.16	1.23	1.30	1.37	1.43	1.50	1.55
4	1	0.93	0.87	0.76	0.66	0.57	0.50	0.44	0.38	0.33
	2	1.00	1.00	0.98	0.96	0.94	0.92	0.88	0.85	0.82
	3	1.03	1.05	1.09	1.13	1.16	1.18	1.20	1.22	1.23
	4	1.04	1.08	1.17	1.25	1.33	1.40	1.48	1.55	1.62
5	1	0.92	0.85	0.73	0.62	0.53	0.45	0.38	0.32	0.28
	2	0.99	0.97	0.94	0.90	0.86	0.82	0.77	0.73	0.69
	3	1.01	1.03	1.04	1.05	1.06	1.06	1.06	1.05	1.03
	4	1.03	1.06	1.12	1.17	1.21	1.25	1.29	1.32	1.35
	5	1.05	1.09	1.17	1.26	1.34	1.42	1.50	1.58	1.65

Example #1:

See Figure 6, Page B-13, Erosion Prediction, Section I, Part B for graphic. Assume a concave slope 400 feet long. The upper third averages 15 percent slope; the middle third averages 10%; the lower third averages 5%. From Table 5, Page B-15, Erosion Prediction, Section I, Part B, LS Factors, record the values that correspond to a 400-foot slope length and the slope of each segment-15%, 10%, 5% (from top to bottom). Based on the slope percentage and the rill/interrill ratio, select the correct slope-length exponent from Table 8 Page B-18, Erosion Prediction, Section I, Part B. Once the correct slope length exponent is selected, select the correct soil loss factor from Table 9, Page B-19, Erosion Prediction, Section I, Part B. Multiply each of the three LS values by the adjustment factor from Table 9. In this example you would use the column for three slope segments. Add the three values together and divide by the number of segments (three in this example). In tabular form the computations are as follows:

Segment No.	Gradient (%)	LS from Table 5	Slope-length Exponent from Table 8	Soil Loss Factor from Table 9	LS for Segment
1	15	5.34	0.58	0.53	2.83
2	10	2.84	0.52	1.05	2.98
3	5	1.13	0.40	1.30	1.47

Total LS = 7.28

Average LS = 7.28 ÷ 3 = 2.42

Example #2:

See Figure 6, Page B-13, Erosion Prediction, Section I, Part B for graphic. Assume a convex slope 400 feet long. The upper third averages 5 percent slope; the middle third averages 10%; the lower third averages 15%. From Table 5, Page B-15, Erosion Prediction, Section I, Part B, LS Factors, record the values that correspond to a 400-foot slope length and the slope of each segment-5%, 10%, 15% (from top to bottom). Based on the slope percentage and the rill/interrill ratio, select the correct slope-length exponent from Table 8, Page B-18, Erosion Prediction, Section I, Part B. Once the correct slope length exponent is selected, select the correct soil loss factor from Table 9, Page B-19, Erosion Prediction, Section I, Part B. Multiply each of the three LS values by the adjustment factor from Table 9. In this example you would use the column for three slope segments. Add the three values together and divide by the number of segments (three in this example). In tabular form the computations are as follows:

Segment No.	Gradient (%)	LS from Table 5	Slope-length Exponent from Table 8	Soil Loss Factor from Table 9	LS for Segment
1	5	1.13	0.40	0.64	0.72
2	10	2.84	0.52	1.05	2.98
3	15	5.34	0.58	1.42	7.58

Total LS = 11.28

Average LS = 11.28 ÷ 3 = 3.76

E. CROP MANAGEMENT FACTOR

There are 11 RUSLE "C" and "K" factor zones in Wyoming as shown in Figure 5, Page B-9 and Figure 7, Page B-24, Erosion Prediction, Part I, Section B. Each zone is represented by the climate database for a selected city. Those cities by zone are:

ZONE	CITY
49	Afton
50	Worland
51	Recluse
52.1	Gillette 9ESE
53.1	Redbird
54	Riverton USBR
55.1	Big Piney
55.2	Border
56	Saratoga 1SSE
57	Torrington Exp. Farm
85	Rapid City, South Dakota

The crop management factors ("C" value) for RUSLE can be found in Table C1 , Pages D-5 to D-63 , Erosion Prediction, Part I, Section D, Appendix.

Crop rotation "C" factors can be constructed by selecting the appropriate "C" factor for each crop in the rotation, adding these "C" factors together and dividing by the sum of the years in the rotation. The "C" factors are based on production levels listed on the "C" factor tables C1, Pages D-5 to D-63, Erosion Prediction, Part I, Section D, Appendix. If additional "C" factors are needed for other crop rotations, contact the State Conservation Agronomist.

Example #1:

A producer in Worland (C/K Zone 50) has a crop rotation of 45 bushel **Barley** (1 yr. following Corn for Silage that is spring plowed) - 20 ton **Beets** (1 yr. following Barley that is spring tilled with 10% residue) - 80 ton **Corn Silage** (1 yr. following Beets that are fall plowed). To determine the composite "C" factor, refer to Table C1, Pages D-11 to D-15, Erosion Prediction, Part I, Section D, Appendix. The single-year "C" factor for a 45 bushel barley crop is **0.20**. The single-year "C" factor for 20 ton beets is **0.12**. The single-year "C" factor for corn silage is **0.19**. To determine the composite "C" factor, multiply the number of years of each crop-type by the associated "C" factor and divide by the total number of years in the rotation. For this example, the composite "C" factor would be:

1 year Barley x 0.20 = 0.20

1 year Beets x 0.12 = 0.12

1 year Corn Silage x 0.19 = 0.19

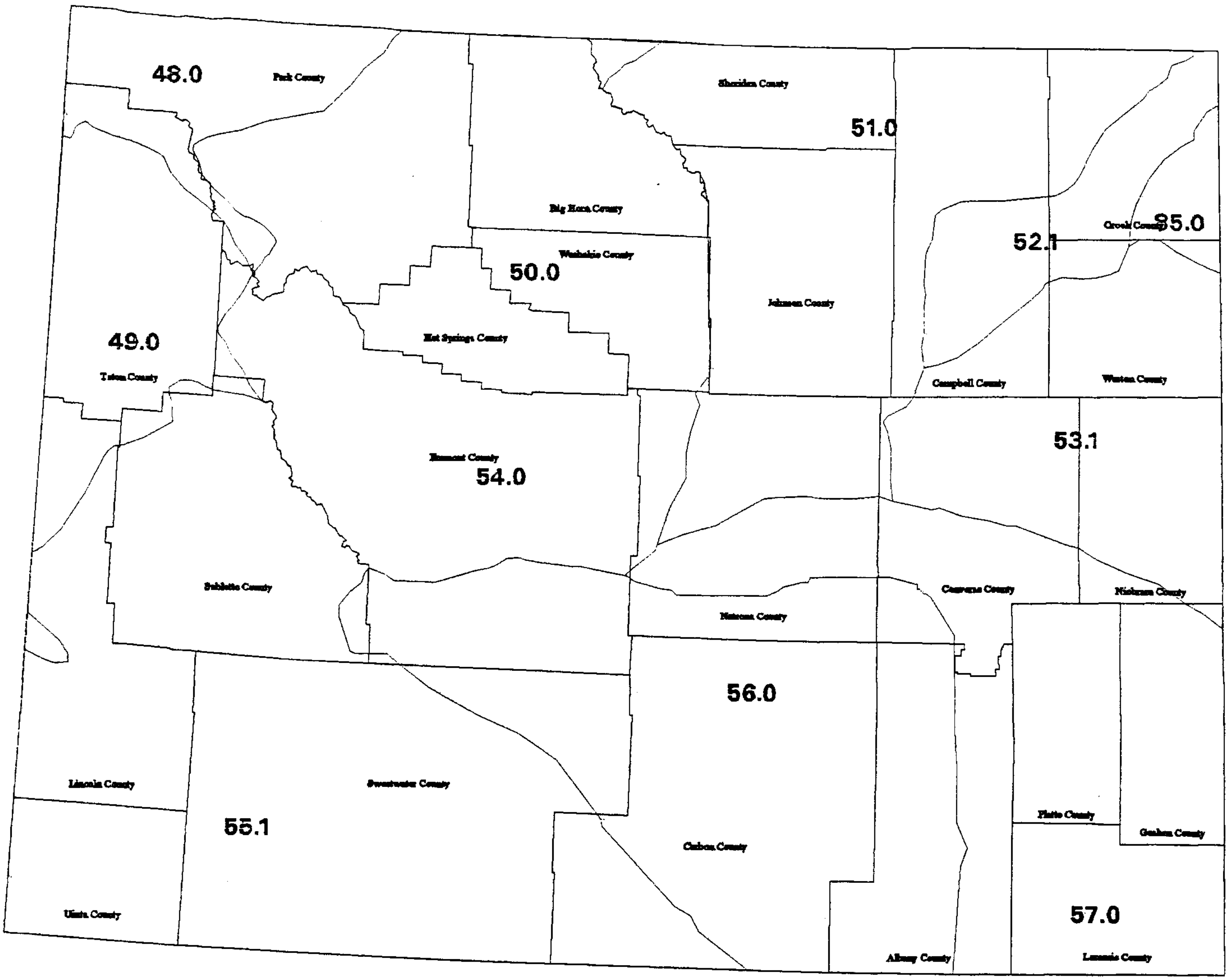
Total = 0.51

Composite “C” Factor for this rotation would be 0.51 ÷ 3 Yrs = 0.17

The residue cover value necessary for "C" factor development can be determined by estimating residue production and reduction for planning purposes or precisely measured in the field. Table 10, Page B-25, Erosion Prediction, Part I, Section B can be used to estimate residue quantities for planning purposes. Estimates of residue reductions can be determined with Tables 11 and 12, Pages B-27 to B-31, Erosion Prediction, Part I, Section B. The values in Table 12 were developed jointly by NRCS and the Equipment Manufacturers Institute in February 1992.

FIGURE 7

EI SUBZONE "C" FACTOR MAP



March 25, 1998 USDA NRCS GIS - Wyoming

TABLE 10

ESTIMATING RESIDUE

Crop	Estimated Air Dry Residue Produced
Alfalfa	3,000 lbs./a.
Barley	80 lbs./bu.
Buckwheat	1.5 lbs./lb.
Corn	60 - 90 lbs./bu.
1/ Corn and/or Sorghum Silage	50 lbs. residue per inch of stubble height per 10,000 plants/a.
Dry Edible Beans	1.0 lbs./lb.
Field Peas	1.0 lbs./lb.
Flax	80 lbs./bu.
1/ Grain Sorghum	60 lbs./bu.
Lentils	1.0 lbs./lb.
Millet	80 lbs./bu.
Mustard	1.5 lbs./lb.
Oats	50 lbs./bu.
Rape Seed	1.5 lbs./lb.
Rye	120 lbs./bu.
Safflower	1.5 lbs./lb.
2/ Soybeans	50 lbs./bu.
Spring Wheat, Durum	100 lbs./bu.
Sugarbeets	15 ~~150~~ lbs./ton
1/ Sunflower	2.2 lbs./lb.
Winter Wheat	120 lbs./bu.
3/ Potatoes, WEGs 1 & 2	
Irrigated, without desiccant	1,100 lbs. (575 lbs. SGe)
Irrigated, with desiccant	600 lbs. (250 lbs. SGe)
Dryland	0 lbs. (0 lbs. SGe)
3/ Potatoes, WEGs 3, 4, 5, 6, 7, & 8	
Irrigated, without desiccants	1,500 lbs. (850 lbs. SGe)
Irrigated, with desiccant	800 lbs. (375 lbs. SGe)
Dryland, without desiccant	1,000 lbs. (500 lbs. SGe)
Dryland, with desiccant	545 lbs. (240 lbs. SGe)

1/ Field experience in the Northern Great Plains indicates the ratio of residue to grain is higher when crops are grown in narrow row seedings. Research data is not available at this time to confirm this common observation. Until research is available, these residue production values may be increased 30 percent when these crops are planted in rows less than 20 inches apart.

2/ Soybeans are considered "narrow row" when planted in rows not over 14 inches apart. The most common spacing is 7 to 8 inches. Field experience in the Northern Great Plains indicates the ratio of residue to grain is higher when soybeans are grown in narrow row seedings, as compared to wide row seedings. Research data is not available, at this time, to confirm this common observation. Until research is available, a ratio of 65 pounds residue per bushel of grain may be used for narrow row soybeans.

3/ Potato residue varies significantly with potato varieties, time of harvest, fertility program, and leaf diseases. If the figures in this table are not accepted, the alternative of collecting surface residue and weighing is available. Refer to the National Range and Pasture Handbook for residue collecting or contact your state agronomist. A minimum of five collections will be required. Weights will be on an air dry basis.

The following information on residue reduction was developed from available research data, NRCS Field Office Technical Guides and from farm equipment manufacturers. Each tillage or planting operation reduces the residue that was present prior to the operation.

Crop residues have been generally classified as being either Nonfragile or Fragile as defined in Table 11, **Residue Types**, Page B-27, Erosion Prediction, Part I, Section B. This is a subjective classification based on the ease in which crop residues are decomposed by the elements or buried by tillage operations. Plant characteristics such as composition and size of leaves and stems, density of the residue, and relative quantities produced were considered.

Many factors affect the amount of residue remaining after a pass with a tractor and tillage or planting implement. Residue amounts are sensitive to depth and speed of equipment operation and row spacing. When selecting values from the ranges in Table 12, **Residue Reduction**, Pages B-28 to B-31, Erosion Prediction, Part I, Section B for a specific implement, consider the following general rules of thumb.

(1) At shallower operating depths, greater amounts of residue remain on the soil surface, while at deeper operating depths, more residue is buried.

(2) Slower operating speeds tend to leave more residues on the soil surface while at faster speeds, more residue is buried. Under some conditions, field cultivators, finishing tools with field cultivator gangs, and some planters and drills may return as much as 20 percent of the residue incorporated at shallow depths by recent operations.

(3) Excess wheel slippage, caused by improper ballasting of tractor tires, can destroy valuable residues in the wheel tracks.

Use the residue reduction figures in Table 12, **Residue Reduction**, Pages B-28 to B-31, Erosion Prediction, Part I, Section B, as a **guide** in selecting the types of equipment and blades, points or sweeps used in the tillage system.

TABLE 11

RESIDUE TYPES

NONFRAGILE		FRAGILE	
Alfalfa or legume hay	Triticale	Canola/Rapeseed	Vegetables
Barley	Wheat	Dry Beans	
Buckwheat	Sorghum	Dry Peas	
Corn	Speltz	Fall seeded cover crops	
Flax Seed		Green Peas	
Forage Seed		Lentils	
Forage Silage		Mustard	
Grass Hay		Potatoes	
Millet		Safflower	
Oats		Soybeans	
Pasture		Sugar Beets	
Popcorn		Sunflowers	
Rye		Sweet Potatoes	

TABLE 12

RESIDUE REDUCTION

IMPLEMENT	PERCENT RESIDUE REMAINING NONFRAGILE 1/	FRAGILE
PLOWS:		
Moldboard plow	0 - 10	0 - 5
Disk plow	10 - 20	5 - 15
MACHINES WHICH FRACTURE SOIL:		
Paratill/Paraplow	80 - 90	75 - 85
"V" ripper/subsoiler, 12 - 14" deep at 20" spacing	70 - 90	60 - 80
Combination Tools		
Subsoil-chisel	50 - 70	40 - 50
CHISEL PLOWS with:		
Sweeps	70 - 85	50 - 60
Straight chisel spike points	60 - 80	40 - 60
Twisted points or shovels	50 - 70	30 - 40
COMBINATION CHISEL PLOWS:		
Coulter Chisel plows with:		
Sweeps	60 - 80	40 - 50
Straight chisel spike points	50 - 70	30 - 40
Twisted points or shovels	40 - 60	20 - 30
Disk Chisel plows with:		
Sweeps	60 - 70	30 - 50
Straight chisel spike points	50 - 60	30 - 40
Twisted points or shovels	30 - 50	20 - 30
UNDERCUTTERS:		
Stubble-mulch sweep or blade plows with:		
Sweep/"V" Blade > 30" wide	85 - 95	70 - 80
Sweeps 20" - 30" wide	80 - 90	65 - 75
DISK HARROWS:		
Offset		
Heavy plowing > 10" spacing	25 - 50	10 - 25
Primary cutting > 9" spacing	30 - 60	20 - 40
Finishing 7"-9" spacing	40 - 70	25 - 40
Tandem		
Heavy plowing > 10" spacing	25 - 50	10 - 25
Primary cutting > 9" spacing	30 - 60	20 - 40
Finishing 7"-9" spacing	40 - 70	25 - 40

TABLE 12 (Cont.)

RESIDUE REDUCTION

IMPLEMENT	PERCENT RESIDUE REMAINING NONFRAGILE 1/	FRAGILE
DISK HARROWS:		
Tandem		
Light tandem disk after harvest, before other tillage	70 - 80	40 - 50
One-way disk with:		
12"-16" blades..........	40 - 50	20 - 40
18"-30" blades..........	20 - 40	10 - 30
Single gang disk	50 - 70	40 - 60
FIELD CULTIVATORS (including leveling attachments):		
Used as the primary tillage operation		
Sweeps 12"-20"	60 - 80	55 -75
Sweeps or shovels 6"-12"	35 - 75	50 - 70
Duckfoot points	35 - 60	30 - 55
Field cultivators as secondary operation following chisel or disk		
Sweeps 12"-20"	80 - 90	60 - 75
Sweeps or shovels 6"-12"	70 - 80	50 - 60
Duckfoot points	60 - 70	35 - 50
FINISHING TOOLS:		
Combination finishing tools with:		
Disks, shanks, and leveling attachments..........	50 - 70	30 - 50
Spring teeth and rolling basket..........	70 - 90	50 - 70
Harrows:		
Springtooth (coil tine)	60 - 80	50 - 70
Spiketooth..........	70 - 90	60 - 80
Flex-tine tooth	75 - 90	70 - 80
Roller harrow (cultipacker)	60 - 80	50 - 70
Packer roller..........	90 - 95	90 - 95
Rotary Tiller		
Secondary operation 3" deep	40 - 60	20 - 40
Primary operation 6" deep..........	15 - 35	5 - 15
RODWEEDERS:		
Plain rotary rod	80 - 90	50 - 60
Rotary rod with semi chisels or shovels..........	70 - 80	60 - 70

TABLE 12 (Cont.)

RESIDUE REDUCTION

IMPLEMENT	PERCENT RESIDUE REMAINING NONFRAGILE 1/	FRAGILE
STRIP TILLAGE MACHINES:		
Rotary tiller, 12" tilled on 40" rows	60 - 75	50 - 60
ROW CULTIVATORS (30" and wider):		
Single sweep per row	75 - 90	55 - 70
Multiple sweeps per row	75 - 85	55 - 65
Finger wheel cultivator	65 - 75	50 - 60
Rolling disk cultivator	45 - 55	40 - 50
Ridge till cultivator	20 - 40	5 - 25
UNCLASSIFIED MACHINES:		
Anhydrous applicator	75 - 85	45 - 70
Anhydrous applicator with closing disks	60 - 75	30 - 50
Subsurface manure applicator	60 - 80	40 - 60
Rotary hoe	85 - 90	80 - 90
Bedders, listers, and hippers	15 - 30	5 - 20
Furrow diker	85 - 95	75 - 85
Mulch treader	70 - 85	60 - 75
DRILLS:		
Hoe opener drills	50 - 80	40 - 60
Semi-deep furrow drill or press drill (7"-12" spacing)	70 - 90	50 - 80
Deep furrow drill with > 12" spacing	60 - 80	50 - 80
Single disk opener drills	85 - 100	75 - 85
Double disk opener drills (conventional)	80 - 100	60 - 80
No-till drills and drills with the following attachments in **standing stubble**:		
Smooth no-till coulters	85 - 95	70 - 85
Ripple or bubble coulters	80 - 85	65 - 85
Fluted coulters	75 - 80	60 - 80
No-till drills and drills with the following attachments in **flat residues:**		
Smooth no-till coulters	65 - 85	50 - 70
Ripple or bubble coulters	60 - 75	45 - 65
Fluted coulters	55 - 70	40 - 60

TABLE 12 (Cont.)

RESIDUE REDUCTION

IMPLEMENT	PERCENT RESIDUE REMAINING NONFRAGILE 1/	FRAGILE
DRILLS (Cont.):		
Air seeders: (Refer to appropriate field cultivator or chisel plow depending on the type of ground engaging device used.)		
ROW PLANTERS:		
Conventional planters with:		
Runner openers	85 - 95	80 - 90
Staggered double disk openers	90 - 95	85 - 95
Double disk openers	85 - 95	75 - 85
No-till Planters:		
Smooth coulters	85 - 95	75 - 90
Ripple coulters	75 - 90	70 - 85
Fluted coulters	65 - 85	55 - 80
Strip till planters with:		
2 or 3 fluted coulters	60 - 80	50 - 75
Row cleaning devices (8-14" wide bare strip using brushes, spikes furrowing disks, or sweeps)	60 - 80	50 - 60
Ridge till planter	40 - 60	20 - 40
CLIMATIC EFFECTS:		
Over winter weathering 2/ **		
Following summer harvest	70 - 90	65 - 85
Following fall harvest	80 - 95	70 - 80
Over summer weathering	70 - 90	65 - 85

** In northern climates with long periods of snow cover and frozen conditions, weathering may reduce residue levels only slightly, while in warmer climates, weathering losses reduce residue levels significantly. The higher figure will be used in most cases.

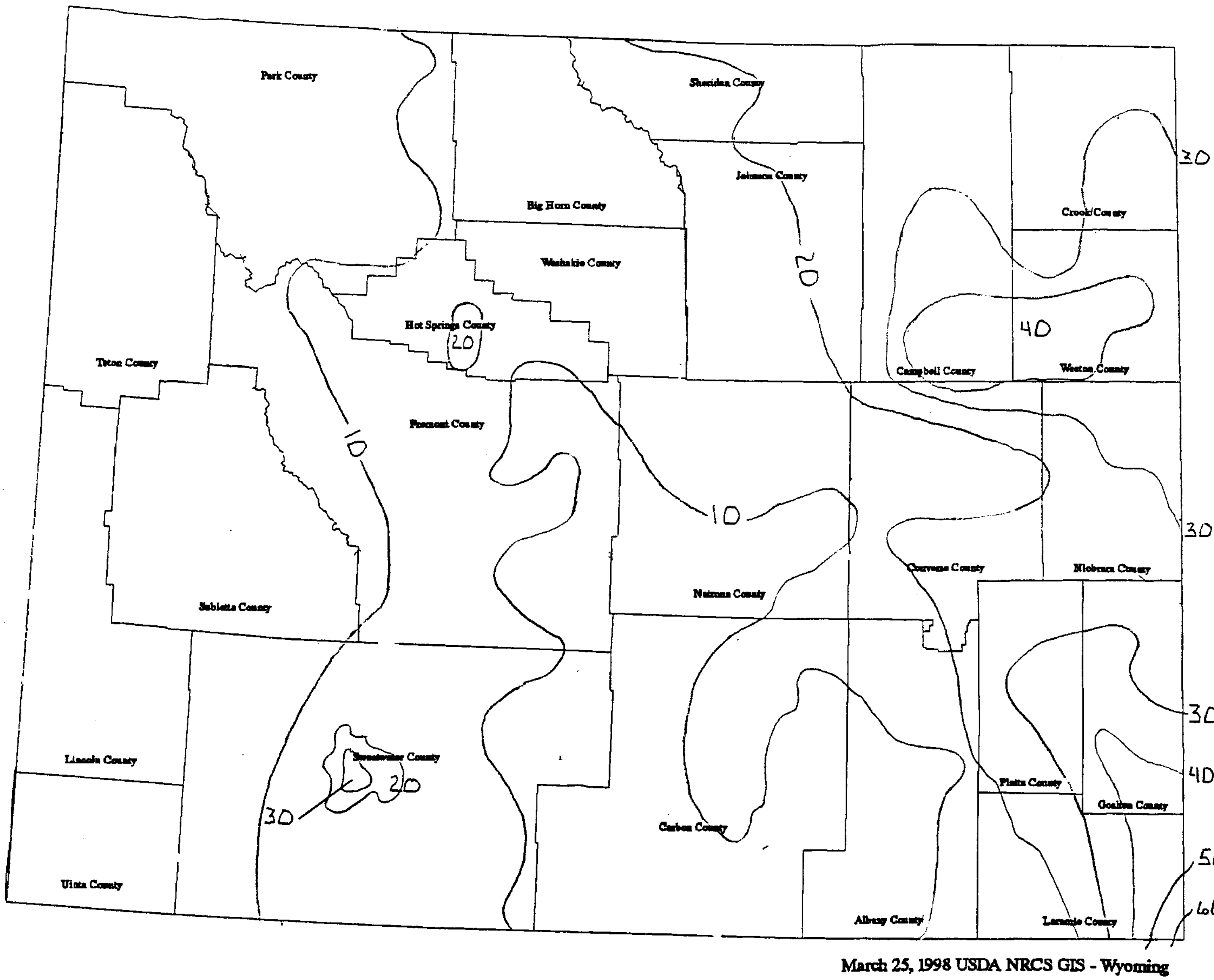
1/ If small grain was harvested with a rotary combine, residue is considered fragile.

F. SUPPORT FACTOR "P"

The "P" factor value used in the RUSLE is a combination of subfactors determined to represent the actual field conditions. After determining the contour on-grade "P" factor, adjustments with subfactors are made as appropriate. These adjustments may increase "P" due to ridge/furrow grade and/or when actual field slope length exceeds the critical slope length for effectiveness of contouring. Stripcropping, buffer strip, and terrace "P" subfactors reduce the "P" factor for on-grade contouring or as adjusted for ridge/furrow grade.

To determine the appropriate "P" factor use the instruction and tables that follow. Contents of this section include:

Figure 8
10-Year Frequency, Single Storm EI Map



Procedure to Determine RUSLE "P" Subfactor Values for Contouring

Step 1 - Gather Required Information

1 - Identify the hydrologic soil group for the soil map unit(s) on the selected landscape from Section II of the FOTG.

2 - Determine the slope length "L" and slope steepness "S" of the landscape profile, and grade along the ridges/furrows that result from tillage, planting and/or row cultivation operations.

3 - Identify the 10-year storm erosivity (10-yr. "EI") value for the site in question from Figure 8, **10-Year Frequency, Single Storm "EI" Map** on Page B-33, Erosion Prediction, Part I, Section B.

4 - Select the Cover-Management Condition from Table 13, **Cover Management Conditions**, on Page B-37, Erosion Prediction, Part I, Section B.

5 - Select the appropriate ridge height using Table 14, **Guidelines for Selecting Ridge Height**, Page B-38, Erosion Prediction, Part I, Section B.

Step 2 - Determine the "P" subfactor for contouring on-grade.

1 - With the 10-year "EI" value, ridge height, hydrologic soil group and cover-management condition, select the appropriate part of Table 3 or 3A, **RUSLE Contour "P" Subfactor Tables for On-grade Condition**, Pages D-64 to D-119, Erosion Prediction, Part I, Section D, Appendix.

2 - Enter the selected table proceeding across the row for the hydrologic group, and read the value in the column for the slope steepness. This value is the "P" subfactor value for contouring on-grade.

Step 3 - Adjust contouring "P" subfactor for ridge/furrow grade.

1 - Calculate the ratio of the field average ridge/furrow grade to the landscape profile slope used to describe the field topographic factor and round to the nearest 0.1. For ratio values <0.05, go to **Step 4** as no adjustment is required for off-grade contouring.

2 - For ratio values of >0.05, go to Table 15, **Contouring "P" Subfactor Value Adjusted for Furrow Grade,** Page B-39, Section I, Part B.

3 - In the left column of Table 15, **Contouring "P" Subfactor Value Adjusted for Furrow Grade,** Page B-39, Section I, Part B, locate the "P" factor value for on-grade contouring obtained from **Step 2** above. If the "P" factor value is an odd number, round up or down to the nearest even number listed in Table 15. Round in the opposite direction from that used when rounding the ridge/furrow grade to landscape profile slope ratio to the nearest 0.1. On the located row, move right to the column for the appropriate ratio of furrow grade to slope steepness of the landscape profile. This value is the RUSLE "P" subfactor value for "off-grade" contouring where the slope is less than the critical slope. Beyond the critical slope length, the practice effectiveness decreases quickly with greater slope length.

Step 4 - Determining the Critical Slope Length

1 - In Wyoming, exceeding the critical slope length is **usually** only a concern with cover management conditions 5, 6, or 7.

2 - Refer to Figures 1-35, **Critical Slope Length,** Pages D-120 to D-154, Section I, Part D, Appendix and select the applicable figure for the hydrologic soil group and cover-management condition.

3 - Enter the selected figure at the landscape slope percent on the horizontal axis and project a vertical line up to intersect the 10-year "EI" value for the site. From that intersection, project a horizontal line to the left and read the critical slope length. This is the critical slope length or the maximum slope length for which the previously determined "P" subfactor value applies. Use the previously determined "P" subfactor value for slopes less than the critical slope length.

4 - Stripcropping decreases the effectiveness of contouring. When used in conjunction with contouring, increase the critical slope length by multiplying the slope length from 3 above by 1.5.

Step 5 - Adjust the contouring "P" subfactor where the landscape profile exceeds the critical slope length.

1 - Where the landscape profile slope length exceeds the critical slope length, calculate the slope length to critical slope length ratio by dividing the landscape profile slope length by the critical slope length. Increase the critical slope length before making this calculation if stripcropping applies.

2 - Use the same rill/interill ratio previously used in determining the topographic "LS" factor at the site. Use medium for cultivated cropland and other land uses with moderately consolidated soil conditions.

3 - Go to Figures 36 - 38, **Slope Length/ Critical Length**, Pages D-155 to D-157, Section I, Part D, Appendix . Select the appropriate figure for the land use rill/interill ratio and the site slope steepness.

4 - From the actual slope length/critical slope length ratio on the horizontal axis of the selected figure, project a vertical line to intersect the "P" subfactor value determined in Steps 2 or 3 above. From that intersection, project a horizontal line to the left and read the effective "P" subfactor value. This subfactor value is the corrected "P" subfactor value for contouring and applies to the entire landscape profile slope length.

Step 6 - Compute rotational contouring "P" subfactor where cover-management conditions and/or ridge heights change from year to year during the life of a crop rotation.

1 - Calculate the contour "P" subfactor for each year in the crop rotation following the appropriate Steps 1-5 above.

2 - Add the contour "P" subfactor values for all years in the rotation and divide by the total years in the rotation to determine a weighted average annual contour "P" subfactor value.

Procedure for calculating RUSLE "P" subfactor values for terracing

Step 1 - Gather required information

1 - Determine the slope steepness of the landscape profile. If the landscape slope steepness will change with the construction of terraces, recalculate slope steepness.

2 - Determine what supporting conservation practice(S) will accompany the terraces; contouring, cross-slope farming, buffer strips, or contour stripcropping.

3 - Decide whether the terrace(s) will have an open or closed outlet.

4 - If the terrace has an open outlet, determine the channel grade of terrace at outlet end. The terrace outlet for this determination is defined as the lesser of 300 feet of 1/3 of the terrace closest to the outlet. If channel grade is 0.8 percent or greater, the practice factor equals 1.0. In this case, skip Step 2 below and proceed with Step 3 below.

Step 2 - Determine terrace "P" subfactor.

1 - From Table 16, Terrace “P” subfactors, Page B-41, Erosion Prediction, Part I, Section B. Select the appropriate horizontal spacing interval. Read across the row to the selected outlet type. If an open outlet is used, than select the terrace channel grade range column that describes the design terrace channel grade. Read the "P" subfactor value at the row-column intersection.

Step 3- If terrace horizontal spacing is less than landscape profile slope length, recalculate the "LS" value to reflect a shorter sheet and rill erosion flow length.

1 - If significant earth moving will cause a change in landscape profile slope, recompute landscape profile slope steepness and length and record for use in Step 2.

2 - Determine new "LS" value from appropriate "LS" table. For cropped agricultural land, use Table 5.

Step 4 - Determine composite "P" factor for terracing when used in conjunction with contouring alone or with contouring and stripcropping.

1 - When terraces are used in conjunction with contouring or cross-slope farming, multiply the terrace "P" subfactor times the previously determined contouring "P" subfactor to get the composite "P" factor.

2 - When terraces are used in conjunction with contouring, buffer strips, or stripcropping, multiply all applicable "P" subfactors together to get the composite "P" factor. Contact the State Conservation Agronomist or use the FOCS RUSLE module to compute stripcropping “P” subfactors.

TABLE 13 - COVER MANAGEMENT CONDITIONS (CMC)

Select the cover management condition that best describes the land surface condition during spring seedbed preparation and planting when rainfall and runoff are most erosive and the soil is the most susceptible to erosion. Use the following descriptions of cropland cover-management conditions for estimation P factor values.

Cover Management Condition	Description
Code 1 - Established Grass/Legume Cover	The grass cover is dense and runoff is very slow, the slowest under any vegetative condition. When mowed and baled, this condition becomes code 2.
Code 2 - Established Hay Under Harvest	Hay is a mixture of grass and legume just before cutting. The vegetative cover is a good grass/legume stand and is harvested for hay. When harvested this cover condition becomes a code 4 until regrowth occurs.
Code 3 - Heavy cover and/or very rough	Ground cover for this condition is about 65 to 95 percent as with no-till planting. Roughness depressions would have the appearance of being 7 inches deep and deeper.
Code 4 - Moderate cover and/or rough	The ground cover for this condition is about 40 to 65 percent. Roughness depressions would have the appearance of being about 4 to 6 inches deep.
Code 5 - Light cover and/or moderate roughness	Ground surface cover is between 10 to 40 percent. Roughness depressions would have the appearance of being on the order of 2 to 3 inches deep.
Code 6 - No cover and/or minimal roughness	This condition is very much like the condition typically found in row cropped fields after the field has been planted and exposed to a moderately intense rainfall. Ground cover is less than 10 percent and the roughness is characteristic of a good seedbed for corn or soybeans. The surface is rougher than that of a finely pulverized seedbed for seeding vegetables or grass.
Code 7 - Clean-tilled, smooth, fallow	This condition is essentially bare, with a cover of 5 percent of less. The soil has not had a crop grown on it in the last 6 months or more. Much of the residual effects of previous cropping has disappeared. The surface is smooth, much like he surface that develops on a very finely pulverized seedbed exposed to several intense rainfalls. This condition is found in fallow and vegetable fields, or in newly seeded lawns.

Table 14 - Guidelines for Selecting Ridge Heights

Select the ridge height that best describes the condition during the spring seedbed preparation and planting when rainfall and runoff are most erosive and the soil is most susceptible to erosion.

1. Very Low (0.5 - 2.0 inches) Ridges

- Plants not closely spaced but with a slight ridge height
- No-till planted row crops
- Fields that have been rolled, pressed, or dragged after planting
- Spring planted conventionally drilled crops
- Direct seeded forage crops that leave a very low ridge

2. Low (2.0 - 3.0 inches) Ridges

- No-till drilled crops
- Mulch tilled row crops
- Clean tilled row crops with no row cultivation
- Transplanted crops, widely spaced

3. Moderate (3.0 - 4.0 inches) Ridges

- Clean tilled row crops with row cultivation
- High yielding winter small grain crops when erosive rains are concentrated in the late spring after plants have developed a stiff, upright stem
- Transplanted crops that are closely spaced and/or in narrow rows

4. High (4.0 - 6.0 inches) Ridges

- Ridge tilled crops with high (4-6") ridges during periods of erosive rain

5. Very High (Greater than 6.0 inches) Ridges

- Ridge tilled crops with very high (6"+) ridges during erosive rains
- Hipping, bedding, or ridging with very high ridges during periods of erosive rain

TABLE 15 - CONTOURING "P" SUBFACTOR VALUE ADJUSTED FOR RIDGE/FURROW GRADE

On Grade Contouring "P" Subfactor Value	Ratio of Furrow Grade to Profile Grade									
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
0.04	0.34	0.47	0.57	0.65	0.72	0.78	0.84	0.90	0.95	1.00
0.06	0.36	0.48	0.57	0.65	0.72	0.79	0.85	0.90	0.95	1.00
0.08	0.37	0.49	0.58	0.66	0.73	0.79	0.85	0.90	0.95	1.00
0.10	0.38	0.50	0.59	0.67	0.74	0.80	0.85	0.90	0.95	1.00
0.12	0.40	0.51	0.60	0.68	0.74	0.80	0.86	0.91	0.95	1.00
0.14	0.41	0.52	0.61	0.68	0.75	0.81	0.86	0.91	0.96	1.00
0.16	0.43	0.54	0.62	0.69	0.75	0.81	0.86	0.91	0.96	1.00
0.18	0.44	0.55	0.63	0.70	0.76	0.82	0.87	0.91	0.96	1.00
0.20	0.45	0.56	0.64	0.71	0.77	0.82	0.87	0.92	0.96	1.00
0.22	0.47	0.57	0.65	0.71	0.77	0.82	0.87	0.92	0.96	1.00
0.24	0.48	0.58	0.66	0.72	0.78	0.83	0.88	0.92	0.96	1.00
0.26	0.49	0.59	0.67	0.73	0.78	0.83	0.88	0.92	0.96	1.00
0.28	0.51	0.60	0.67	0.74	0.79	0.84	0.88	0.92	0.96	1.00
0.30	0.52	0.61	0.68	0.74	0.79	0.84	0.89	0.93	0.96	1.00
0.32	0.54	0.62	0.69	0.75	0.80	0.85	0.89	0.93	0.97	1.00
0.34	0.55	0.64	0.70	0.76	0.81	0.85	0.89	0.93	0.97	1.00
0.36	0.56	0.65	0.71	0.76	0.81	0.86	0.90	0.93	0.97	1.00
0.38	0.58	0.66	0.72	0.77	0.82	0.86	0.90	0.93	0.97	1.00
0.40	0.59	0.67	0.73	0.78	0.82	0.86	0.90	0.94	0.97	1.00
0.42	0.60	0.68	0.74	0.79	0.83	0.87	0.91	0.94	0.97	1.00
0.44	0.62	0.69	0.75	0.79	0.84	0.87	0.91	0.94	0.97	1.00
0.46	0.63	0.70	0.76	0.80	0.84	0.88	0.91	0.94	0.97	1.00
0.48	0.64	0.71	0.76	0.81	0.85	0.88	0.92	0.95	0.97	1.00
0.50	0.66	0.72	0.77	0.82	0.85	0.89	0.92	0.95	0.97	1.00
0.52	0.67	0.73	0.78	0.82	0.86	0.89	0.92	0.95	0.98	1.00
0.54	0.69	0.75	0.79	0.83	0.87	0.90	0.92	0.95	0.98	1.00
0.56	0.70	0.76	0.80	0.84	0.87	0.90	0.93	0.95	0.98	1.00
0.58	0.71	0.77	0.81	0.85	0.88	0.91	0.93	0.96	0.98	1.00
0.60	0.73	0.78	0.82	0.85	0.88	0.91	0.93	0.96	0.98	1.00
0.62	0.74	0.79	0.83	0.86	0.89	0.91	0.94	0.96	0.98	1.00
0.64	0.75	0.80	0.84	0.87	0.89	0.92	0.94	0.96	0.98	1.00
0.66	0.77	0.81	0.85	0.88	0.90	0.92	0.94	0.96	0.98	1.00
0.68	0.78	0.82	0.86	0.88	0.91	0.93	0.95	0.97	0.98	1.00
0.70	0.79	0.83	0.86	0.89	0.91	0.93	0.95	0.97	0.98	1.00

TABLE 15 (cont.) - CONTOURING "P" SUBFACTOR VALUE ADJUSTED FOR RIDGE/FURROW GRADE

On Grade Contouring "P" Subfactor Value	Ratio of Furrow Grade to Profile Grade									
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
0.72	0.81	0.85	0.87	0.90	0.92	0.94	0.95	0.97	0.99	1.00
0.74	0.82	0.86	0.88	0.90	0.92	0.94	0.96	0.97	0.99	1.00
0.76	0.84	0.87	0.89	0.91	0.93	0.95	0.96	0.97	0.99	1.00
0.78	0.85	0.88	0.90	0.92	0.94	0.95	0.96	0.98	0.99	1.00
0.80	0.86	0.89	0.91	0.93	0.94	0.95	0.97	0.98	0.99	1.00
0.82	0.88	0.90	0.92	0.93	0.95	0.96	0.97	0.98	0.99	1.00
0.84	0.89	0.91	0.93	0.94	0.95	0.96	0.97	0.98	0.99	1.00
0.86	0.90	0.92	0.94	0.95	0.96	0.97	0.98	0.99	0.99	1.00
0.88	0.92	0.93	0.95	0.96	0.96	0.97	0.98	0.99	0.99	1.00
0.90	0.93	0.94	0.95	0.96	0.97	0.98	0.98	0.99	0.99	1.00
0.92	0.95	0.96	0.96	0.97	0.98	0.98	0.99	0.99	1.00	1.00
0.94	0.96	0.97	0.97	0.98	0.98	0.99	0.99	0.99	1.00	1.00
0.96	0.97	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00
0.98	0.99	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

TABLE 16
TERRACE "P" SUBFACTORS

Terrace Interval	Closed	0.1	0.2	0.4	0.6	0.8	>0.8
<100	.48	.52	.54	.61	.72	.90	1.00
105	.51	.55	.57	.63	.73	.91	1.00
120	.58	.62	.63	.69	.77	.92	1.00
135	.64	.67	.69	.73	.81	.94	1.00
150	.70	.72	.74	.77	.84	.94	1.00
180	.78	.80	.81	.84	.88	.96	1.00
210	.84	.86	.86	.88	.92	.97	1.00
240	.89	.90	.90	.92	.94	.98	1.00
270	.92	.93	.93	.94	.96	.99	1.00
300	.94	.95	.95	.96	.97	.99	1.00
400	.98	.98	.98	.99	.99	1.00	1.00
500	.99	.99	.99	1.00	1.00	1.00	1.00

Example A: Contour "P" Factor Determination

Step 1 - Gather Information

1 - Hydrologic Soil Group B

2 - Landscape profile slope steepness - 6 percent and slope length = 250 feet

3 - 10-year “EI” = 60, from Figure 10, **10-Year Frequency, Single Storm "EI" Map** on Page B-33, Erosion Prediction, Part I, Section B.

4 - Ridge furrow grade = 1 percent

5 - The crop rotation is continuous corn using conventional clean tillage. From Table 13, **Cover Management Conditions**, Page B-37, Erosion Prediction, Section I, Part B, this is Cover Management Condition 6.

6 - Ridges and furrows created during corn planting are 2-3 inches in depth or low ridges from Table 14, **Guidelines for Selecting Ridge Heights**, Page B-38, Erosion Prediction, Section Part B.

Step 2- Determine the "P" subfactor for contouring on-grade.

1 - From Table 3, **RUSLE Contour "P" Subfactor Tables for On-grade Condition**, Page D-86, Erosion Prediction, Part I, Section D, Appendix, 10-year "EI" = 60 and Cover Management Condition 6, select the table for low ridge height (2-3" ridges).

2 - Find the row for Hydrologic Soil Group B and the value in the slope percent column for six percent slope. Read the "P" subfactor value of 0.31 for on-grade contouring.

Step 3 - Adjust the contouring "P" subfactor for ridge/furrow grade.

1 - The ridge/furrow to field slope steepness ratio is calculated as 1% ÷ 6% = 0.167, which is rounded up to 0.2.

2 - Go to Table 15, **Contouring "P" Subfactor Value Adjusted for Furrow Grade,** Page B-39, Section I, Part B as ridge/furrow to field slope ratio > 0.05 indicates a correction applies.

3 - Since Table 15 does not have an on-grade contour line for 0.31, round the value up or down to 0.30 or 0.32. Since the ridge/furrow to slope grade ratio was rounded up, round down this time to 0.30. Enter Table 15 with the on-grade contouring "P" subfactor value of 0.30 and read across to the ridge/furrow to slope grade ratio of 0.2. The value is 0.61. This is the "P" subfactor value for off-grade contouring where the slope is less than the critical slope.

Step 4 - Determine the critical slope length.

1 - From Figure 10, **Critical Slope Length,** Page D-129, Section I, Part D, Appendix, (Hydrologic Soil Group B, Cover Management Condition 6), at the 6 percent slope "EI"-10 = 60 intersect, read a critical length of 500 feet. The critical slope exceeds the 250 foot slope length at the site, so the "P" subfactor value of 0.61 applies to the entire landscape profile slope length.

Example B - Contour "P" Factor Determination When Actual Slope Length Exceeds Critical Slope Length

Step 1 - Gather Information

1 - Hydrologic Soil Group C.

2 - Landscape profile slope = 6 percent, and slope length = 450 feet.

3 - Ridge/furrow grade = 1 percent

4 - The 10-Year "EI" = 70 from Figure 10, **10-Year Frequency, Single Storm "EI" Map** on Page B-33, Erosion Prediction, Part I, Section B.

5 - The crop rotation is corn-soybeans produced using conventional clean tillage. From Table 13, **Cover Management Conditions**, on Page B-37, Erosion Prediction, Part I, Section B, this is Cover Management Condition 6.

6 - A ridge height of 2-3 inches is formed by tillage and planting equipment on this soil. From Table 14, **Guidelines for Selecting Ridge Heights**, Page B-38, Erosion Prediction, Section I, Part B this is a low ridge.

Step 2 - Determine the "P" subfactor for contouring on-grade.

1 - In Table 3, **RUSLE Contour "P" Subfactor Tables for On-grade Condition**, Page D-90, Erosion Prediction, Part I, Section D, Appendix, 10-year "EI" = 70 and Cover Management Condition 6, select the table for low ridge height (2-3" ridges).

2 - Find the row for Hydrologic Soil Group C and the value in the intersect column for 6 percent slope. Read the "P" subfactor value of 0.47.

Step 3 - Adjust contouring "P" subfactor fro ridge/furrow grade.

1 - Calculate the ridge/furrow to field slope steepness ratio by dividing 1% ÷ 6% = 0.167, which is rounded to 0.2.

2 - Go to Table 15, **Contouring "P" Subfactor Value Adjusted for Furrow Grade,** Page B-39, Section I, Part B as ridge/furrow to field slope ratio > 0.05 indicates a correction applies.

3 - Since Table 15 does not have a line for 0.47, round the value up or down to 0.46 or 0.48. Since the ridge/furrow to slope grade ratio was rounded up, round down this time to 0.46. Enter Table 15 with the on-grade contouring "P" subfactor value of 0.46 and read across to the ridge/furrow to slope grade ratio of 0.2. The value is 0.70. This is the "P" subfactor for off-grade contouring where the slope is less than the critical slope.

Step 4 - Determine the critical slope length.

1 - Select Figure 16, **Critical Slope Length,** Page D-135, Section I, Part D, Appendix, (Hydrologic Soil Group C, Cover Management Condition 6.

2 - Enter with the 6 percent slope, read up to intersection of "EI"-10 = 70 and across to find a critical length of 340 feet. The profile slope length of 450 feet exceeds the critical slope length so adjust the "P" subfactor value of 0.70.

Step 5 - Adjust the contouring "P" subfactor for critical slope length.

1 - The actual slope length/critical slope length ratio is 450/340 = 1.3

2 - Select Figure 37, **Slope Length/ Critical Length**, Page D-156, Section I, Part D, Appendix that applies to the slope range (4.1% to 12%) and the medium rill/interrill ratio used to describe cropped agricultural land.

3 - Find the slope length/critical length ratio of 1.3 on the horizontal axis, project a vertical line to intersect the previously determined "P" subfactor value of 0.70 for the site. From that intersection, project a horizontal line to the left and read the "P" effective subfactor value of 0.78. The value of 0.78 is the contouring "P" subfactor value that applies to the entire landscape profile slope length.

Example C: Contour "P" Factor Determination For A Crop Rotation With Varying Ridge Height

Step 1 - Gather Information. This includes assembling information about the crop rotation. Include the crop grown, ridge height as applicable, and the cover management condition for each year in the rotation. Select ridge height and cover management condition based on those conditions during the seedbed and planting period.

1 - the Hydrologic Soil Group is B.

2 - Landscape profile slope steepness = 6 percent and slope length is 400 feet.

3 - Ridge/furrow grade is 1 percent.

4 - the 10-year "EI" = 60 from Figure 10, **10-Year Frequency, Single Storm "EI" Map** on Page B-33, Erosion Prediction, Part I, Section B.

5 - Crop rotation is six years and includes Corn for grain, Corn for grain, Oats for grain, followed by 3 years of hay.

6 - Crops and tillage practices are moldboard plow corn after hay; mulch till corn after corn, 50 percent cover, mulch till oats after corn, 30 percent cover, followed by three years of alfalfa-intermediate wheatgrass hay production. Corn after hay is row cultivated within 30 days of planting.

7 - Ridge height = 3-4" for corn after hay; 2-3" for mulch till corn after corn; 0.5-2" for oats after corn; and 3 years of alfalfa-wheatgrass hay = no ridges.

8 - Cover management condition of corn after hay = 6; corn after corn = 4; oats after corn = 5; and alfalfa - wheatgrass hay/haylage = 2.

Step 2 - Calculate the "P" subfactor for each year where cover management condition or ridge height change. Make adjustments as needed when actual slope length exceeds the critical slope length.

1 - Ridge/furrow to profile grade = 1% ÷ 6% = 0.167, which is rounded to 0.2, for all annual crops where ridges are formed.

2 - Corn after hay, on-grade "P" = 0.21 from Table 3, **RUSLE Contour "P" Subfactor Tables for On-grade Condition**, Page D-86, Erosion Prediction, Part I, Section D, Appendix, 10-year "EI" = 60 and Cover Management Condition 6. Off-grade "P" = 0.56 from Table 15, **Contouring "P" Subfactor Value Adjusted for Furrow Grade,** Page B-39, Section I, Part B as ridge/furrow to field slope ratio > 0.05 indicates a correction applies. Critical slope length = 500 feet from Figure 10, **Critical Slope Length,** Page D-129, Section I, Part D, Appendix, (Hydrologic Soil Group B, Cover Management Condition 6). The critical slope length exceeds the 400 foot slope length at the site, so the "P" subfactor value of 0.56 applies to the entire landscape profile slope length.

3 - Corn after corn, on-grade "P" = 0.30 from Table 3, **RUSLE Contour "P" Subfactor Tables for On-grade Condition**, Page D-85, Erosion Prediction, Part I, Section D, Appendix, 10-year "EI" = 60 and Cover Management Condition 4. Off-grade "P" = 0.61 from Table 15, **Contouring "P" Subfactor Value Adjusted for Furrow Grade,** Page B-39, Section I, Part B as ridge/furrow to field slope ratio > 0.05 indicates a correction applies. Critical slope length =>1,000 feet from Figure 8, **Critical Slope Length,** Page D-127, Section I, Part D, Appendix, (Hydrologic Soil Group B, Cover Management Condition 4) thus no adjustment for exceeding critical slope length is required.

4 - Oats after corn, on-grade "P" = 0.50 from Table 3, **RUSLE Contour "P" Subfactor Tables for On-grade Condition**, Page D-86, Erosion Prediction, Part I, Section D, Appendix, 10-year "EI" = 60 and Cover Management Condition 5. Off-grade "P" = 0.72 from Table 15, **Contouring "P" Subfactor Value Adjusted for Furrow Grade,** Page B-39, Section I, Part B as ridge/furrow to field slope ratio > 0.05 indicates a correction applies. Critical slope length => 1,000 feet from Figure 9, **Critical Slope Length,** Page D-128, Section I, Part D, Appendix, (Hydrologic Soil Group B, Cover Management Condition 5) thus no adjustment for exceeding critical slope length is required.

5 - Alfalfa - intermediate wheatgrass hay. No ridges present, therefore contour "P" subfactor = 1.0.

Step 3 - Calculate the weighted average annual contour "P" subfactor for the rotation.

1 - Add the values in Step 2 and divide by the number of years in the crop rotation. The result is the weighted average annual contour "P" subfactor for the crop rotation. For this example:

0.56 + 0.61 + 0.72 + 1.0 + 1.0 + 1.0 = 4.65 ÷ 6 Yrs = 0.82

Example D: Terrace "P" Factor Determination

Step 1 - Gather required information

1 - Hydrologic Soil Group C

2 - Landscape profile slope steepness = 6 percent and slope length = 450 feet.

3 - The 10-year "EI" = 70, from Figure 10, **10-Year Frequency, Single Storm "EI" Map** on Page B-33, Erosion Prediction, Part I, Section B.

4 - The crop rotation is corn-soybeans produced using conventional clean tillage. From Table 13, **Cover Management Conditions**, on Page B-37, Erosion Prediction, Part I, Section B, this is Cover Management Condition 6. A ridge height of 2-3 inches is formed by tillage and planting equipment on this soil. This is a low ridge from Table 14. Contouring will be used. Row grades parallel terrace channels.

5 - The landscape profile slope steepness will not change with terrace construction.

6 - Horizontal spacing interval selected is 150 feet to split original landscape profile slope length (450 feet) into thirds.

7 - Open outlet design with terrace channel grade of 0.4 percent.

Step 2 - Determine "P" subfactor for terracing

1 - In Table 16, **Terrace “P” Subfactors**, Page B-41, Erosion Prediction, Part I, Section B, find the horizontal interval range (terrace spacing) for 150 feet and read across to percent grade of 0.4. Read the terrace "P" subfactor value of 0.77.

Step 3 - Adjust LS" value.

1 - Slope length after terrace installation is 150 feet. Adjust the "LS" factor value.

2 - Enter the "LS" Table 5, **RUSLE Slope Effect Factors**, Page B-15, Erosion Prediction, Part I, Section B for Cropped Agricultural Land. Find the column for 150 feet of slope length and the value in the intersected row for 6 percent slope. Read the new "LS" value of 0.93. Enter this new value into the general RUSLE equation.

Step 4 - Adjust contouring "P" subfactor for ridge/furrow grade.

1 - Contour "P" subfactor is based on a low ridge (2-3 inches), 6 percent slope, 10-year "EI" = 70 and Hydrologic Soil Group of C. On-grade "P" = 0.47 from Table 3, **RUSLE Contour “P” Subfactor for On-grade Condition**, Page D-90, Erosion Prediction, Part I, Section D, Appendix, 10-year “EI” = 70 and Cover Management Condition 6.

2 - For 0.4 percent row grade calculate the ridge/furrow to field slope steepness ratio by dividing 0.4% ÷ 6% = 0.066, and round to 0.10. Go to Table 15, **Contouring "P" Subfactor Value Adjusted for Furrow Grade,** Page B-39, Section I, Part B as ridge/furrow to field slope ratio > 0.05 indicates a correction applies.

3 - Since Table 15 does not have a line for 0.47, round the value up or down to 0.46 or 0.48. Since the ridge/furrow to slope grade ratio was rounded up, round this time to 0.46. Enter Table 15 with the on-grade contouring "P" subfactor value of 0.46 and read across to the ridge/furrow to slope grade ratio of 0.1. The adjusted "P" subfactor value is 0.63. This is the "P" subfactor value for off-grade contouring where the slope is less than the critical slope length.

Step 5 - Determine the critical slope length

1 - Select Figure 16, **Critical Slope Length,** Page D-135, Section I, Part D, Appendix, for Hydrologic Soil Group C and cover management code 6.

2 - Enter with the 6 percent slope, read up to intersection of 10-year "EI" = 70 and across to find a critical length of 340 feet. The new profile slope length of 150 feet with terraces does not exceed the critical slope length so no adjustment of the "P" subfactor is needed.

Step 6 - Determine the composite "P" factor

1 - Multiply terrace "P" subfactor 0.77 times off-contour "P" subfactor 0.63. Composite "P" factor = 0.49.